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Scientific and Technical Subcommittee
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Draft report

VI. Space-system-based disaster management support

1. In accordance with General Assembly resolution 70/82, the Subcommittee considered agenda item 9, "Space-system-based disaster management support".

2. The representatives of Algeria, China, Egypt, Germany, India, Indonesia, Italy, Japan, Mexico, Pakistan, the Republic of Korea, the Russian Federation, Sri Lanka, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 9. A statement was also made under the item by the representative of Chile on behalf of the Group of Latin American and Caribbean States. A representative of the Office for Outer Space Affairs made a statement on the activities of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). The representative of CANEUS International made a statement on its Global-Sat initiative to coordinate a number of satellite constellations in support of the Sendai Framework for Disaster Risk Reduction 2015-2030. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

3. The Subcommittee heard the following scientific and technical presentations:

(a) "German Aerospace Center (DLR) contributions to face global challenges: protection of the environment, climate change and disaster management", by a representative of Germany;

(b) "Increasing food security by using satellite-enhanced crop insurance and disaster management", by a representative of Switzerland;

(c) "Synergic use of COSMO-SkyMed and Sentinel data for disaster management support", by a representative of Italy;

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(d) "Global warming and negative impacts on Egypt", by a representative of Egypt.

4. The Subcommittee had before it the following:

(a) Report on the United Nations/Germany International Conference on Earth Observation: global solutions for the challenges of sustainable development in societies at risk, held in Bonn, Germany, from 26 to 28 May 2015 (A/AC.105/1097);

(b) Report on the knowledge portal of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response: recent advances (A/AC.105/1101);

(c) Report on the United Nations International Conference on Space-based Technologies for Disaster Management: a consolidating role in the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030, held in Beijing from 14 to 16 September 2015 (A/AC.105/1102);

(d) Report on joint activities carried out in 2015 by the regional support offices of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (A/AC.105/1103);

(e) Report on activities carried out in 2015 in the framework of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (A/AC.105/1105);

(f) Note by the Secretariat entitled "UN-SPIDER: strengthening drought early warning systems in Central America and the Dominican Republic" (A/AC.105/C.1/2016/CRP.19).

5. The Subcommittee expressed its appreciation for the efforts of the Office for Outer Space Affairs to bring the reports on the activities of UN-SPIDER in 2015 to its attention, and noted with satisfaction the progress made with regard to activities planned in the framework of UN-SPIDER, including the continuing advisory support and other support provided through it for emergency response efforts. Some delegations informed the Subcommittee that they were implementing recommendations emanating from the technical advisory services of UN-SPIDER.

6. The Subcommittee noted that in 2015, UN-SPIDER, with the continued support of its network of partners, had carried out missions for advisory support and assessment in Gabon, Honduras and the Lao People's Democratic Republic, as well as an expert mission to El Salvador. The Subcommittee noted with satisfaction the capacity-building efforts in the form of training sessions held in Bangladesh, Bhutan, China, Colombia, Mexico, South Africa and the United States, addressing concrete requirements and providing follow-up to the UN-SPIDER technical advisory missions carried out in previous years.

7. The Subcommittee also acknowledged with appreciation the progress and developments with respect to the UN-SPIDER knowledge portal (www.un-spider.org), in particular the availability of multiple language versions.

8. The Subcommittee took note of the more than 20 activities planned for 2016, to be reported on in detail at the next session of the Subcommittee, and noted the synergies and cross-border actions facilitated by the UN-SPIDER programme. It

also took note of other capacity-building sessions planned and emphasized the need for increased capacity-building support in the various regions.

9. The Subcommittee welcomed the planned outreach activities of UN-SPIDER and its developing partnerships with United Nations entities, international organizations and Governments to continue promoting the use of space-based tools and information in global and regional initiatives, such as under the Sendai Framework for Disaster Risk Reduction 2015-2030 and the 2030 Agenda for Sustainable Development. It also noted that more complementary relationships between UN-SPIDER and other initiatives should be established and existing relationships strengthened, including with Sentinel Asia.

10. The Subcommittee noted with satisfaction the ongoing activities of member States to increase the availability and use of space-based solutions in support of disaster risk reduction, particularly in the context of the Sendai Framework for Disaster Risk Reduction 2015-2030, and also in support of the UN-SPIDER programme. Those activities included promoting emergency observation in the event of natural or technological disasters under the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also referred to as the International Charter on Space and Major Disasters) and in the framework of the Sentinel Asia programme. They also included the support given by the DLR Center for Satellite-based Crisis Information for several operational mapping and analysis tasks for disaster events worldwide, including the contribution of satellite data for use in several of the International Charter activations.

11. The Subcommittee also noted with satisfaction other activities of member States in the same area, such as the promotion, with the support of UN-SPIDER, of the International Charter's universal access initiative, the provision of national or regional data portals for the dissemination of information in near-real time such as the national support centre for satellite information applications of the Republic of Korea, and the production of risk assessments and mapping based on space-based information. Further activities included the support provided through the Regional Visualization and Monitoring System programmes in the Himalayas and Africa funded by the United States, such as the establishment of a new node in Niger; and other examples of products defined for specific and sectoral end users at the national level.

12. The Subcommittee noted with satisfaction the activities conducted by several member States, directly or through the International Charter, to facilitate access to satellite imagery and space-based information to support the response effort following the Nepal earthquake of May 2015.

13. The Subcommittee noted that the International Charter had been activated over 470 times since its creation, and 39 times in 2015 alone. The Subcommittee also noted that Sentinel Asia had been activated 22 times for disasters including typhoons, floods, earthquakes, volcanic eruptions and landslides.

14. The Subcommittee noted the efforts conducted by several member States through the Committee on Earth Observation Satellites, in particular in the context of its working group on disasters.

15. Some delegations expressed the view that partnerships, international agreements and full and open data-sharing arrangements were becoming increasingly important to ensure the effective distribution of space-based data and their use by emergency managers and other authorities worldwide. Various services offered by space agencies were noted, such as the provision of current satellite imagery and information ready for use in geographic information systems.

16. Some delegations indicated that they supported the declaration signed in Mexico City on 18 September 2015 at the summit of the heads of space agencies on climate change and disaster management, organized by the International Academy of Astronautics.

17. Some delegations commented on the networks of satellites currently in operation that supported disaster management efforts. They made reference to upcoming missions to launch new satellites for these types of applications.

18. The view was expressed that space-based data can be beneficial in many more disaster situations, not only sudden-onset but also slow-onset disasters, and that more support was needed to make space-based data widely available for monitoring events related to terrorism.

19. The Subcommittee noted the in-kind contributions made by member States and regional support offices in 2015, including the provision of experts, to all UN-SPIDER technical advisory missions and related activities, and of their efforts to share experiences with other interested countries.

20. The Subcommittee noted with great appreciation the voluntary contributions that were being made by member States, including the cash contributions from Austria, China, Germany and Switzerland, and again encouraged other member States to provide UN-SPIDER voluntarily with all necessary support, including increased financial support, to enable it to better respond to Member States' requests for assistance and to fully carry out its workplan for the next biennium.

VII. Recent developments in global navigation satellite systems

21. In accordance with General Assembly resolution 70/82, the Subcommittee considered agenda item 10, "Recent developments in global navigation satellite systems", and reviewed issues related to the International Committee on Global Navigation Satellite Systems (ICG), the latest developments in the field of global navigation satellite systems (GNSS) and new GNSS applications.

22. The representatives of China, India, Japan, the Russian Federation, Pakistan and the United States made statements under agenda item 10. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

23. The Subcommittee had before it the following:

(a) Note by the Secretariat on the tenth Meeting of the International Committee on Global Navigation Satellite Systems (A/AC.105/1104);

(b) Report of the Secretariat on activities carried out in 2015 in the framework of the workplan of the International Committee on Global Navigation Satellite Systems (A/AC.105/1106);

(c) Report on the United Nations/Russian Federation workshop on the applications of global navigation satellite systems (A/AC.105/1098).

24. The Subcommittee noted with appreciation the achievements of providers and users of positioning, navigation and timing services in promoting GNSS, as reflected in the publication *International Committee on Global Navigation Satellite Systems: The Way Forward — 10 Years of Achievement 2005-2015* (ST/SPACE/67).

25. The Subcommittee was informed that the Office for Outer Space Affairs, as the executive secretariat of ICG, handled coordination for the planning of meetings of ICG and its Providers' Forum in conjunction with sessions of the Committee and its subsidiary bodies. It was noted that the executive secretariat also maintained a comprehensive information portal for ICG and users of GNSS services and continued to play an active role in promoting international cooperation to use the capabilities of GNSS in order to support sustainable development.

26. The Subcommittee also noted that the regional centres for space science and technology education, affiliated to the United Nations, which also served as information centres for ICG and its Providers' Forum, were working towards the establishment of a network of institutions involved or interested in GNSS. They were also identifying new applications that could be developed in the regions on the basis of GNSS services.

27. The Subcommittee noted that a United Nations/Russian Federation workshop on the applications of global navigation satellite systems had been held in Krasnoyarsk, Russian Federation, from 18 to 22 May 2015. The main objectives of the workshop had been to strengthen regional information and data exchange networks on the use of GNSS technology, including various training programmes in GNSS and its applications, and to develop a regional plan of action that would contribute to the wider use of multi-constellation GNSS.

28. The Subcommittee noted with satisfaction that the tenth meeting of ICG and the fifteenth meeting of the Providers' Forum, organized by the Department of State and the University Corporation for Atmospheric Research on behalf of the Government of the United States, was held in Boulder, Colorado, from 1 to 6 November 2015. The Subcommittee also noted that 2015 had been a year of accomplishment for ICG and a fitting commemoration of the tenth anniversary of the establishment of ICG.

29. The Subcommittee noted that the eleventh meeting of ICG would be hosted by the Russian Federation, in Sochi, from 6 to 11 November 2016. The Subcommittee also noted the expression of interest by Japan in hosting the twelfth meeting of ICG in 2017, by China to host the thirteenth meeting in 2018, and by India to host the fourteenth meeting in 2019.

30. The Subcommittee noted that the ICG working groups focused on the following issues: compatibility and interoperability; enhancement of the performance of GNSS services; information dissemination and capacity-building; and reference frames, timing and applications. The Subcommittee also noted that the working groups had made substantive progress in furthering the ICG workplan.

31. The Subcommittee noted the proposal by ICG that the Subcommittee explore, at its next session in 2017, the feasibility of a focused review, within its current agenda item on recent developments in global navigation satellite systems, of issues related to GNSS spectrum protection and interference detection and mitigation. The Subcommittee also noted that the intent behind the proposal was to raise awareness of this issue among States members of the Committee on the Peaceful Uses of Outer Space as part of efforts to achieve the overall goal of promoting effective use of GNSS open services by the global community.

32. The Subcommittee commended the Office for Outer Space Affairs for its outstanding performance in its capacity as the executive secretariat of ICG and its Providers' Forum, and expressed appreciation for the efforts of the Office in bringing attention to the benefits of GNSS throughout the world, particularly for developing nations.

33. The Subcommittee noted with appreciation the financial contributions made by the United States and the European Commission to the Office for Outer Space Affairs in support of GNSS-related activities, ICG, its Providers' Forum and its working groups.

34. The Subcommittee noted that the Global Positioning System (GPS) of the United States continued to be a central pillar in an emerging international system of GNSS. It was noted that GPS accuracy currently averaged a user range error of 70 centimetres. The Subcommittee also noted that new GPS Block IIF satellites had led to incremental increases in overall system performance and a build-up in the number of satellites transmitting the new civilian GPS signals known as "L2C" and "L5".

35. The Subcommittee noted that the United States intended to continue improving the accuracy and availability of GPS through enhanced performance and modernized satellites. The United States continued to broadcast GPS signals free of direct user charges and continued to strongly support international cooperation for peaceful civil, commercial and scientific purposes among current and future GNSS providers.

36. The Subcommittee noted that the civil services of the Global Navigation Satellite System (GLONASS) of the Russian Federation were accessible, effective and fully responsive to the needs of different users, and that the launch of the latest GLONASS-M navigation satellite into orbit completed the space segment of the system. The Subcommittee also noted that the System of Differential Correction and Monitoring, an augmentation to GLONASS, continued to be updated and was to be used in civil aviation for enhancing navigation precision.

37. The Subcommittee noted that thanks to the deployment of infrastructure elements, the provision of GLONASS-based precise point positioning to support applications requiring real-time access was beginning to be organized. The Subcommittee noted that an open service performance standard was being developed, which demonstrated the commitment to providing a basic performance standard for the system's users. It was noted that there was international cooperation aimed at making GLONASS an essential element of the international GNSS infrastructure, with benefits for users worldwide.

38. The Subcommittee noted that three pairs of satellites had been launched in 2015 as part of the Galileo satellite navigation system (Galileo 7 and 8, Galileo 9 and 10 and Galileo 11 and 12), and had been released to their target altitude of 23,500 kilometres (km). It was noted that with six new satellites in orbit, the cruise mode of production, testing and deployment of the full satellite constellation was currently approaching.

39. The Subcommittee noted that the goal, as set by the European Commission, was to have Galileo deliver initial services, including a free public service, an encrypted public regulated service and search-and-rescue services, by the middle of 2016.

40. The Subcommittee noted that the building of the BeiDou Navigation Satellite System (BDS) of China had been steadily pushed forward in accordance with its three-step development strategy, expanding from regional to global coverage and transiting from active to passive location. It was noted that BDS, comprised of 30 satellites, will constitute a complete space constellation by 2020.

41. The Subcommittee noted that the year 2015 had been of particular significance for the BDS establishment, which had witnessed the stable operation of regional services and the formal deployment of a new generation of satellites. Those satellites had higher performance characteristics and were more compatible and interoperable with other navigation satellite systems. The application development process would be given high priority in order to broaden the range of fields in which the BDS and GNSS applications could be used.

42. The Subcommittee noted that India was currently implementing its satellite navigation programme made up of two systems: the GPS-aided Geostationary-augmented Navigation System (GAGAN), which was a satellite-based augmentation system, and the Indian Regional Navigation Satellite System (IRNSS), which was an independent regional system. It was noted that GAGAN signals certified for approach procedures with vertical guidance 1 (APV 1) had been broadcast since May 2015, and that apart from using GAGAN in the aviation sector, India was taking initiatives to use GAGAN in non-aviation sectors.

43. The Subcommittee also noted that the IRNSS constellation was in the implementation phase. It consisted of seven satellites: three in geostationary orbits and four in geosynchronous orbits. The first five IRNSS satellites had been launched, and the IRNSS signal-in-space was successfully being broadcast and received. It was noted that ground systems, including International Laser Ranging Service stations, had been established to support IRNSS operation, and that the full constellation was expected to be completed by April 2016.

44. The Subcommittee noted that Michibiki, the first satellite of the Quasi-Zenith Satellite System (QZSS) of Japan, was currently performing all its functions, and continued to undergo verification of its applications for surveying and personal and car navigation, as well as for new fields such as farming and construction. In addition to positioning and GPS augmentation, QZSS could provide a messaging service that would contribute to disaster management.

45. The Subcommittee also noted that a satellite-based augmentation system service using QZSS, which was an air navigation aid to augment GPS, was scheduled to undergo a functional test and certification process beginning in 2018.

QZSS would be expanded and upgraded to become an operational regional satellite-based navigation system to improve positioning in the Asia-Pacific region.

46. The Subcommittee noted that the Space and Upper Atmosphere Research Commission of Pakistan was actively developing a GNSS programme and had been involved in establishing infrastructure across the country to support users. The Karachi network of continuously operating reference stations had been established to enable precise positioning applications, and GNSS signals were monitored and analysed for ionospheric and tropospheric scientific research.

47. The Subcommittee noted with appreciation that Brazil, the Czech Republic and ESA had reported on their projects and activities focused on helping to bring GNSS technology to the widest possible user community and ensure the participation of international partners in those programmes.